



Product Service

Choose certainty.
Add value.

6 March 2014

Page 1 of 20

Prüfbericht / Test Report

Nr. / No. 70464-37519-02 (Edition 1)

Auftraggeber Weatherdock AG Germany
Applicant

Geräteart AIS Transmitter
Type of equipment

Typenbezeichnung easyONE (AIS-MOB)
Type designation

Seriennummer / A109
Serial number

Auftragsnummer / 1984
Order No.

Prüfgrundlage EN 300 440-1 V1.6.1
Test standards

EN 300 440-2 V1.4.1

Summary

Prüfergebnisse / Test Results	Auftragsnummer / Order No. 1984							
Die Prüfungen wurden nach folgenden Vorschriften durchgeführt: <i>Tests were performed according to:</i>								
EN 300 440-1 V1.6.1 EN 300 440-2 V1.4.1								
Durchgeführte Prüfung <i>Test performed</i>				Prüfergebnis <i>Test result</i>				
	Erfüllt Passed	Nicht erfüllt Not Passed	Nicht zutreffend Not applicable	Nicht durchgeführt Not performed				
Effektive Isotropische Strahlungsleistung / Effective isotropically radiated power	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>				
Modulationsbandbreite / Permitted range of operating frequencies	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>				
Nebenaussendungen / Unwanted emissions in the spurious domain	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>				
Duty Cycle/ Duty cycle	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>				
Empfängerempfindlichkeit / Receiver sensitivity	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>				
Nachbarkanalselektivität / Adjacent channel selectivity	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>				
Blocking / Blocking	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>				
Empfänger-Nebenaussendungen / Receiver spurious radiation	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
Spektrum / Spectrum Access Techniques	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>				

Bemerkungen / Remarks:

Die Prüfergebnisse beziehen sich ausschließlich auf das zur Prüfung vorgestellte Prüfmuster. Ohne schriftliche Genehmigung des Prüflabors darf der Prüfbericht auszugsweise nicht vervielfältigt werden. *The test results relate only to the individual item which has been tested. Without the written approval of the test laboratory this report may not be reproduced in extracts.*

Datum / Date	Geprüft von / Tested by	Freigabe durch / Checked by	Prüfergebnis / Test Result
2014-03-06	 Martin Steindl Responsible for testing	 Johann Roidt Laboratory manager	<input checked="" type="checkbox"/> Erfüllt / Passed <input type="checkbox"/> Nicht erfüllt / Not passed

Table of Contents

1	Administrative Data.....	4
2	Details about the Test Laboratory.....	5
3	Description of the Equipment Under Test	6
4	Operation Mode and Configuration of EUT.....	7
5	Receiver category	8
5.1	General performance criteria	8
5.2	Performance criteria as declared by applicant.....	9
6	Referenced Regulations	10
7	Measurement Uncertainty Values.....	11
8	Test Results	15
8.1	Receiver spurious radiation	17
9	Additional informations.....	19
10	Revision History	20

1 Administrative Data

Application details

Applicant:	Weatherdock AG Germany Sigmundstraße 180 D-90431 Nürnberg
Contact person:	Nr. Norman Jörns
Order number:	1984
Receipt of EUT:	2014-03-03
Return of EUT:	2014-03-03
Date(s) of test:	2014-03-03
Note(s):	Mr. Jörns, representing the applicant attended all tests. The EUT was in care of Mr. Jörns all the time. This test reports covers the radio spectrum matters of the GPS receiver of the EUT, only.
Responsible for testing:	Mr. Martin Steindl
Responsible for test report:	Mr. Martin Steindl
Test report checked by:	Mr. Johann Roidt

Report details

Report number:	70464-37519-02
Edition:	1
Issue date:	2014-03-06

2 Details about the Test Laboratory

Details about the Test Laboratory

Company name:	TÜV SÜD Product Service GmbH
Address:	Äußere Frühlingstraße 45 D-94315 Straubing Germany
Laboratory accreditation:	DAkkS Registration No. D-PL-11321-11-01
Contact:	Mr. Johann Roidt
	Phone: +49 9421 5522-0 Fax: +49 9421 5522-99

3 Description of the Equipment Under Test

Equipment characteristics	
Type designation:	easyONE (AIS-MOB)
Parts of the system:	
Options and accessories:	
Type of equipment:	AIS Transmitter
Serial number:	A109
Manufacturer:	Weatherdock AG
Application:	GPS
Equipment class:	Equipment for portable use
Kind of equipment:	Receiver
Frequency range:	1575.42 MHz
Operating Frequency:	1575.42 MHz
Rated Carrier Power:	N/A
Channel spacing	Wideband
Number of RF-channels:	1
Antenna type:	Integrated
Antenna size:	N/A
Receiver category:	3 (Standard reliable SRD communication media)
Standby mode:	Not Applicable
Temperature Range:	-20 °C to +55 °C
Nominal Temperature:	+20 °C
Power supply:	Battery supply (lithium)
	Nominal: 6.0 V
Version of EUT:	As received

4 Operation Mode and Configuration of EUT

Operation Mode(s)

GMDSS standby, GPS active

List of ports and cables

No.	Description	Classification ¹	Cable type	Cable length
S1	GMDSS Antenna	signal/control port	Unshielded	33 cm

List of devices connected to EUT

No.	Description	Type designation	Serial no. or ID	Manufacturer

List of support devices

No.	Description	Type designation	Serial no. or ID	Manufacturer

¹ Ports shall be classified as ac power, dc power or signal/control port.

5 Receiver category

The product family of short range radio devices is divided into three receiver categories, each having a set of relevant receiver requirements and minimum performance criteria. The set of receiver requirements depends on the choice of receiver category by the equipment provider.

Receiver category		
Receiver category	Relevant receiver clauses in referenced standard	
1	8.1, 8.2 and 8.3	Highly reliable SRD communication media; e.g. serving human life inherent systems (may result in a physical risk to a person).
2	8.2 and 8.3	Medium reliable SRD communication media e.g. causing Inconvenience to persons, which cannot simply be overcome by other means.
3	8.3	Standard reliable SRD communication media e.g. Inconvenience to persons, which can simply be overcome by other means (e.g. manual).
Selected receiver category:		3 (Standard reliable SRD communication media)
Note:	With reference to the present document manufacturers are recommended to declare category of their devices in accordance with this table, as relevant. In particular where an SRD which may have an inherent safety of human life implication, manufacturers and users should pay particular attention to the potential for interference from other systems operating in the same or adjacent bands.	

The receiver category 1, 2 or 3 shall be stated in the user's manual for the equipment.

5.1 General performance criteria

General performance criteria	
<input type="checkbox"/> A SND/ND ratio of 20 dB, measured at the receiver output through a telephone psophometric weighting network	
<input type="checkbox"/> After demodulation, a data signal with a bit error of 10^{-2} , provided that forward error correction, where provided, is disabled	
<input type="checkbox"/> After demodulation, a message acceptance ratio of 80 %	
<input type="checkbox"/> Applicant declares the performance criteria used to determine the performance of the receiver as described in 5.2.	
<input checked="" type="checkbox"/> Not Applicable	

5.2 Performance criteria as declared by applicant

Performance criteria		
<i>Criteria during test</i>		
<i>Criteria</i> <i>a</i>	<i>Pass</i>	<i>Fail</i>
A	Operating as intended No loss of function	Any degradation of performance
B	Loss of function (one or more)	---
<i>Criteria after test</i>		
<i>Criteria</i> <i>a</i>	<i>Pass</i>	<i>Fail</i>
A	Operating as intended No loss of function No degradation of performance	Any degradation of performance
B	Operating as intended Loss of function(s) self-recoverable No degradation of performance	Any degradation of performance not self-recoverable

Methods of Observation			
<i>Function</i>	<i>Observed size</i>	<i>Permissible range</i>	<i>Observation method</i>

6 Referenced Regulations

<i>European publication</i>	<i>International publication</i>	<i>Title</i>
EN 55016-1-1:2007 + A1:2007 + A2:2008	IEC/CISPR 16-1-1:2007 Edition 2.2	Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-1: Radio disturbance and immunity measuring apparatus - Measuring apparatus
EN 55016-1-4:2007 + A1:2008	IEC/CISPR 16-1-4:2008 Edition 2.1	Specification for radio disturbance and immunity measuring apparatus and methods - Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-4: Radio disturbance and immunity measuring apparatus - Ancillary equipment - Radiated disturbances
EN 300 440-1 V1.6.1	---	Electromagnetic compatibility and Radio Spectrum Matters (ERM); Short range devices; Radio equipment to be used in the 1 GHz to 40 GHz frequency range; Part 1: Technical characteristics and test methods
EN 300 440-2 V1.4.1	---	Electromagnetic compatibility and Radio Spectrum Matters (ERM); Short range devices; Radio equipment to be used in the 1 GHz to 40 GHz frequency range; Part 2: Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive

7 Measurement Uncertainty Values

Radio Testing			
Test	k_p	Expanded Uncertainty	Note
RF-Frequency error	1.96	$\pm 1 \cdot 10^{-7}$	7
RF-Power, conducted carrier	1.96	+0.077 dB / -0.078 dB	7
RF-Power uncertainty for given BER	1.96	+0.94 dB / -1.05	7
RF power, conducted, spurious emissions	1.96	+1.4 dB / -1.6 dB	7
RF power, radiated			
25 MHz – 4 GHz	1.96	+3.6 dB / -5.2 dB	8
1 GHz – 18 GHz	1.96	+3.8 dB / -5.6 dB	8
18 GHz – 26.5 GHz	1.96	+3.5 dB / -4.5 dB	8
26.5 GHz – 66 GHz	1.96	+4.0 dB / -6.5 dB	8
Spectral Power Density, conducted	1.96	+1.4 dB / -1.6 dB	5
Maximum frequency deviation			
300 Hz – 6 kHz	2	$\pm 2,89 \%$	2
6 kHz – 25 kHz	2	$\pm 0.2 \text{ dB}$	2
Maximum frequency deviation for FM	2	$\pm 2,89 \%$	2
Adjacent channel power 25 MHz – 1 Ghz	2	$\pm 2.31 \%$	2
Temperature	2	$\pm 0.39 \text{ K}$	4
(Relative) Humidity	2	$\pm 2.28 \%$	2
DC- and low frequency AC voltage			
DC voltage	2	$\pm 0.01 \%$	2
AC voltage up to 1 kHz	2	$\pm 1.2 \%$	2
Time	2	$\pm 0.6 \%$	2

Radio Interference Emission Testing			
Test	k_p	Expanded Uncertainty	Note
Conducted Voltage Emission			
9 kHz to 150 kHz (50Ω/50µH AMN)	2	± 3.8 dB	1
150 kHz to 30 MHz (50Ω/50µH AMN)	2	± 3.4 dB	1
100 kHz to 200 MHz (50Ω/5µH AMN)	2	± 3.6 dB	1
Discontinuous Conducted Emission			
9 kHz to 150 kHz (50Ω/50µH AMN)	2	± 3.8 dB	1
150 kHz to 30 MHz (50Ω/50µH AMN)	2	± 3.4 dB	1
Conducted Current Emission			
9 kHz to 200 MHz	2	± 3.5 dB	1
Magnetic Fieldstrength			
9 kHz to 30 MHz (with loop antenna)	2	± 3.9 dB	1
9 kHz to 30 MHz (large-loop antenna 2 m)	2	± 3.5 dB	1
Radiated Emission			
Test distance 1 m (ALSE)			
9 kHz to 150 kHz	2	± 4.6 dB	1
150 kHz to 30 MHz	2	± 4.1 dB	1
30 MHz to 200 MHz	2	± 5.2 dB	1
200 MHz to 2 GHz	2	± 4.4 dB	1
2 GHz to 3 GHz	2	± 4.6 dB	1
Test distance 3 m			
30 MHz to 300 MHz	2	± 4.9 dB	1
300 MHz to 1 GHz	2	± 5.0 dB	1
1 GHz to 6 GHz	2	± 4.6 dB	1
Test distance 10 m			
30 MHz to 300 MHz	2	± 4.9 dB	1
300 MHz to 1 GHz	2	± 4.9 dB	1

Radio Interference Emission Testing (continued)

Test	k_p	Expanded Uncertainty	Note
Radio Interference Power			
30 MHz to 300 MHz	2	± 3.5 dB	1
Harmonic Current Emissions			
Voltage Changes, Voltage Fluctuations and Flicker			

Immunity Testing

Test	k_p	Expanded Uncertainty	Note
Electrostatic Discharges			
Radiated RF-Field			
Pre-calibrated field level	2	+32.2 / -24.3 %	5
Dynamic feedback field level	2.05	+21.2 / -17.5 %	3
Electrical Fast Transients (EFT) / Bursts			
Surges			
Conducted Disturbances, induced by RF-Fields			
via CDN	2	+15.1 / -13.1 %	6
via EM clamp	2	+42.6 / -29.9 %	6
via current clamp	2	+43.9 / -30.5 %	6
Power Frequency Magnetic Field	2	+20.7 / -17.1 %	2
Pulse Magnetic Field			
Voltage Dips, Short Interruptions and Voltage Variations			
Oscillatory Waves			
Conducted Low Frequency Disturbances			
Voltage setting	2	± 0.9 %	2
Frequency setting	2	± 0.1 %	2
Electrical Transient Transmission in Road Vehicles			

Note 1:

The expanded uncertainty reported according to CISPR 16-4-2:2003-11 is based on a standard uncertainty multiplied by a coverage factor of $k_p = 2$, providing a level of confidence of $p = 95.45\%$

Note 2:

The expanded uncertainty reported according to UKAS Lab 34 (Edition 1, 2002-08) is based on a standard uncertainty multiplied by a coverage factor of $k_p = 2$, providing a level of confidence of $p = 95.45\%$

Note 3:

The expanded uncertainty reported according to UKAS Lab 34 (Edition 1, 2002-08) is based on a standard uncertainty multiplied by a coverage factor of $k_p = 2.05$, providing a level of confidence of $p = 95.45\%$

Note 4:

It has been demonstrated that the used test equipment meets the specified requirements in the standard with at least a 95%confidence.

Note 5:

The expanded uncertainty reported according to IEC 61000-4-3 is based on a standard uncertainty multiplied by a coverage factor of $k_p = 2$, providing a level of confidence of $p = 95.45\%$

Note 6:

The expanded uncertainty reported according to IEC 61000-4-6 is based on a standard uncertainty multiplied by a coverage factor of $k_p = 2$, providing a level of confidence of $p = 95.45\%$

Note 7:

The expanded uncertainty reported according ETSI TR 100 028 V1.4.1 (all parts) to is based on a standard uncertainty multiplied by a coverage factor of $k_p = 1.96$, providing a level of confidence of $p = 95.45\%$

Note 8:

The expanded uncertainty reported according to ETSI TR 102 273 V1.2.1 (all parts) is based on a standard uncertainty multiplied by a coverage factor of $k_p = 1.96$, providing a level of confidence of $p = 95.45\%$

8 Test Results

Transmitter Tests

EN 300 440-1			
Section(s)	Test performed	Page	Test Result
7.1	Effective radiated power	---	Not applicable
7.2	Permitted range of operating frequencies	---	Not applicable
7.3	Unwanted emissions in the spurious domain		
7.3.2	Conduted – Transmitter operating	---	Not applicable
7.3.2	Conduted – Transmitter standby	---	Not applicable
7.3.3	Radiated – Transmitter operating	---	Not applicable
7.3.4	Radiated – Transmitter standby	---	Not applicable
7.4	Duty Cycle	---	Not applicable
7.5	FHHS Modulation	---	Not applicable

Receiver Tests

EN 300 440-1			
Section(s)	Test performed	Page	Test Result
8.1	Adjacent channel selectivity	---	Not applicable
8.2	Blocking	---	Not applicable
8.3	Receiver spurious radiation		
8.3.2	Conducted	---	Not applicable
8.3.3	Radiated	18	Test passed
8.3.4			

Spectrum Access Techniques

EN 300 440-1			
<i>Section(s)</i>	<i>Test performed</i>	<i>Page</i>	<i>Test Result</i>
9.1	Principle for Listen Before Talk (LBT)	---	Not applicable
9.2	Receiver LBT threshold and transmitter max-on-time	---	Not applicable
9.3	Detect And Avoid techniques (DAA)	---	Not applicable
9.4	Adaptive Frequency Agility (AFA)	---	Not applicable

8.1 Receiver spurious radiation

8.1.1 Test Equipment List

Type	Designation	Inv.-no.	Serial No. or ID	Manufacturer
<input checked="" type="checkbox"/> Spectrum analyzer	FSP30	1666	100036	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver	Cabin no. 3	ESPI7	2010	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver		ESU8	2044	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver		ESMI	1569	Rohde & Schwarz
			839379/013	
			839587/006	
<input type="checkbox"/> Attenuator	4776-10	1638	9412	Narda
<input type="checkbox"/> Attenuator	4776-20	1639	9503	Narda
<input type="checkbox"/> DC-block	7006	1636	A2798	Weinschel
<input checked="" type="checkbox"/> Preamplifier	Cabin no. 2	CPA9231A	1651	Schaffner
<input checked="" type="checkbox"/> Preamplifier (1 – 8 GHz)		AFS3-00100800-32-LN	1684	Miteq
<input type="checkbox"/> Preamplifier (0.5 – 8 GHz)		AMF-4D-005080-25-13P	1685	Miteq
<input type="checkbox"/> Preamplifier (8 – 18 GHz)		ACO/180-3530	1484	CTT
<input checked="" type="checkbox"/> Trilog antenna	Cabin no. 2	VULB 9163	2058	Schwarzbeck
<input type="checkbox"/> Trilog antenna		VULB 9163	1802	Schwarzbeck
<input checked="" type="checkbox"/> Horn antenna		3115	1516	EMCO
<input type="checkbox"/> Horn antenna		HF907	2073	Rohde & Schwarz
<input type="checkbox"/> Horn antenna		3160-03	1010	EMCO
<input type="checkbox"/> Horn antenna		3160-04	1011	EMCO
<input type="checkbox"/> Horn antenna		3160-05	1012	EMCO
<input checked="" type="checkbox"/> Horn antenna		3160-06	1013	EMCO
<input checked="" type="checkbox"/> Horn antenna		3160-07	1014	EMCO
<input checked="" type="checkbox"/> Horn antenna		3160-08	1015	EMCO
<input type="checkbox"/> Horn antenna		3160-09	1265	EMCO
<input type="checkbox"/> Horn antenna		3160-10	1575	EMCO
<input type="checkbox"/> Horn antenna		24240-20	2086	Flann
<input type="checkbox"/> Horn antenna		25240-25	2180	Flann
<input type="checkbox"/> Horn antenna		27240-25	2182	Flann
<input type="checkbox"/> Harmonic Mixer Accessories		FS-Z30	1577	Rohde & Schwarz
<input type="checkbox"/> External Mixer		WM782A	1576	Tektronix
<input type="checkbox"/> External Mixer		WM782U	2085	Tektronix
<input type="checkbox"/> External Mixer		WM782V	2140	Tektronix
<input type="checkbox"/> External Mixer		WM782W	2181	Tektronix
<input checked="" type="checkbox"/> Fully anechoic room		No. 2	1452	Albatross
<input type="checkbox"/> Semi anechoic room		No. 3	1453	Siemens
<input type="checkbox"/> Semi anechoic room		No. 8	2057	Albatross

8.1.2 Test Results

Results for receiver spurious emissions in test are documented as listed below.

Radiated

Prüfdatum / Date of test:	2014-03-03
Prüfer / Operator:	Martin Steindl
Messplatz / Test site:	Fully anechoic room, cabin no. 2

Prüfergebnis / Test Result	
<input checked="" type="checkbox"/>	Erfüllt / Passed
<input type="checkbox"/>	Nicht erfüllt / Not passed

Luftdruck / Barometric pressure:	955.3 hPa
Relative Luftfeuchtigkeit / Relative humidity:	30.1 %
Temperatur / Ambient temperature:	23.9 °C

Prüfgrundlage / Specifications:	EN 300 440-1 V1.6.1, Sections 8.3.3, 8.3.4
Betriebsart / Operation mode:	GPS receiver active
Kommentar / Comment:	

Frequency (MHz)	Resolutionbandwidth (kHz)	Spurious emission level (dBm)	Limit (dBm)	Margin (dB)
162.28	100	-71.7	-57.0	14.7
287.86	100	-72.7	-57.0	15.7
1944.13	1000	-62.1	-47.0	15.1
4698.93	1000	-52.4	-47.0	5.4
4728.03	1000	-52.0	-47.0	5.0
4860.60	1000	-51.1	-47.0	4.1

Grenzwert / Limit

Frequencies \leq 1000 MHz

Frequencies $>$ 1000 MHz

2 nW (-57 dBm)

20 nW (-47 dBm)

9 Additional informations

There are no additional informations to this test report

10 Revision History

Revision History			
<i>Edition</i>	<i>Date</i>	<i>Issued by</i>	<i>Modifications</i>
1	2014-03-06	M. Steindl (gz)	First Edition